THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR ...Paul D. Young.....

TITLE OF THESIS ...Extraversion, Neuroticism, cognitive.....

...complexity and word usage strategies.....

.....

DEGREE FOR WHICH THESIS WAS PRESENTED ..Master of Arts.....

YEAR THIS DEGREE GRANTED ..1978.....

THE UNIVERSITY OF ALBERTA

Extraversion, neuroticism, cognitive complexity and word usage strategies

by

(C) Paul D. Young

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF Master of Arts

IN

Psychology

EDMONTON, ALBERTA

Fall, 1978

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled Extraversion, neuroticism, cognitive complexity and word usage strategies

submitted by Paul D. Young

in partial fulfilment of the requirements for the degree of Master of Arts

in Personality.

To Deborah, the stimulus for many hypotheses

Abstract

Seventy-two subjects, evenly divided as to sex, were classified into experimental groups based on scores on the extraversion and neuroticism scales of the EPQ, and on cognitive complexity level as assessed by Asch's Impression Formation Test. They were tested for response strategies with words ambiguous as to part of speech. Subjects scoring high on the neuroticism dimension made more uncommon responses and performed less quickly than stable subjects. Cognitively simple introverts also used the uncommon response category more frequently than simple extraverts, while cognitively complex subjects fell between the two groups. The relative effects of extraversion and complexity are discussed in the light of an elaboration hypothesis, and the role of anxiety in the task performance of neurotics is explored.

Acknowledgement

I gratefully acknowledge my committee for making me think,
my wife for making me work,
and my parents ...

Table of Contents

List of Tables

List of Figures

I. INTRODUCTION

Wechsler (1958) stated that "the size of a man's vocabulary is not only an index of his schooling, but also an excellent measure of his general intelligence" (p.84). In a number of factor-analytic studies of the various Wechsler tests of intelligence, Cohen (1959) supported Wechsler's contention, finding that the vocabulary subtests provided the best measure of g . Vocabulary subtests require the subject to define words which are graded on level of difficulty, or to use words in a meaningful sentence. The present study investigates the relationship between word-definition and usage strategies and certain personality dimensions.

Even casual experience administering intelligence tests brings to attention the polysemous character of a number of vocabulary subtest items; eg., "slice" and "sentence" on the Wechsler Adult Intelligence Scale, and "tap" and "lecture" on the Stanford-Binet Intelligence Scale. Wechsler (1958) observed that in defining a word, a subject tells not only the word's meaning, but also a great deal about himself. Matarazzo (1972) added, "...where there are several choices or alternative definitions possible, the particular meaning of the word which a subject chooses to define is also of some significance" (p.486).

During intelligence testing, however, few subjects have spontaneously offered more than one definition of multiple-meaning vocabulary items. A response set of giving

multiple definitions to vocabulary items on the Wechsler scales is unusual enough that Matarazzo (1972) has classified it as overelaboration, which may be indicative of a tendency to pedantism or to overintellectualization.

In her study, Young (1969) found intelligence to be the single most important factor in a task of providing multiple definitions fcr ambiguous words. While her findings suggested that the highly intelligent subject may have more alternative definitions for a given word than his or her less gifted peers, it appears that most subjects of average intelligence have at least one choice to make in defining multi-meaning words of high-frequency usage. Conrad (1974) suggested that the various meanings of a polysemous word were activated in memory at the time of stimulation (by means of the "subjective lexicon", an idea presented by George Miller in his 1970 presidential address to the American Psychological Association). Selection of the appropriate wcrd occurred relatively late in cognitive processing, according to Conrad, when the context of usage came into play for disambiguation.

There have been very few psychological studies attempting to assess the differential function of the various meanings of polysemous words (Jastrzembski and Stanners, 1975; Conrad, 1974; Teyler, Roemer, Harrison and Thcmpson, 1973; Roydes and Osgood, 1972), and none of these have assessed the relationship of preferential usage to individual differences in personality. Due to the paucity of

research in this area, it was necessary in the present study to rely more heavily on theoretical considerations than on previous empirical findings.

In an attempt to investigate the factors involved in choice of definitions, the present study focussed on the relationship of definition set with extraversion, neuroticism, cognitive complexity and intelligence.

This study relies heavily on the assumption present in personality theory that the dimension of extraversion-introversion adequately differentiates the effective source of stimulation (Jung, 1923; Eysenck, 1947). This assumption posits that the extravert responds optimally and is adequately aroused by stimuli impinging upon him or her from the external environment alone, whereas the introvert functions best through internalized representations and cognitive manipulations of external stimuli. Put simply, the extravert responds to external stimuli, the introvert to internal. A further necessary assumption present in this theory is that there is an optimal level of arousal for all individuals.

Introverts do seem to have a preference for complex physical stimuli (Bryson and Driver, 1972; Eysenck, 1947). However, this finding has been opposed on theoretical grounds (Lynn and Butler, 1962), and it appears to be confounded with findings relating to another individual difference variable, cognitive complexity vs. cognitive simplicity. A basic assumption of cognitive complexity

theory (Schroder, Driver and Streufert, 1967) has been that cognitively complex individuals prefer more complex stimuli than their simple counterparts. This assumption has not been borne out empirically for complexity alone; however, the combination of cognitive complexity and extraversion has led to some interesting results.

Bryson and Driver (1972) investigated the effects of cognitive complexity (after Schroder, Driver and Streufert, 1967) and extraversion, and found that cognitively simple subjects preferred the physically more complex stimuli, while cognitively complex persons preferred the physically more simple stimuli. The interaction of cognitive complexity with extraversion was significant, leading Bryson and Driver to suggest that the effect of cognitive complexity was largely due to differences in the introverted group.

This finding meshes nicely with extraversion theory. Extraverted subjects, attending mainly to the external characteristics of a given stimulus, should tend to respond less to the internalized input of cognitive manipulations, which is in turn dependent upon the extravert's level of cognitive complexity. If this were the case, extraverts would be expected to generate random preference judgments for physical stimuli of varying complexity. Introverts, on the other hand, should be much more likely to engage in and attend to cognitive manipulation. Assuming this to be true, introverts would then be expected to respond differentially to the perceived complexity of an external stimulus, again

depending upon their level of cognitive complexity. While all introverts would be expected to engage in this cognitive manipulation, the cognitively simple introverts may not be able to actualize this tendency, due to the simple nature of their cognitive approach to the stimulus situation.

Relating cognitive complexity and stimulus complexity has been problematic for complexity theory (Schroder et al, 1967). As outlined above, the assumption that cognitive complexity predicts preference for complex stimuli has not been consistently supported by empirical data. Theoretically, the generality of stimulus complexity preference is limited by the extent to which individuals attend to that variable. If we assume that the evaluation of the complexity of a given stimulus is a cognitive and hence an internalized function, then it follows from the previous argument that introverted individuals will respond to differential stimulus complexity; whereas extraverts will fail to attend to this internal evaluation and thus fail to respond differentially in any consistent fashion.

In sum, it may be hypothesized that the two variables of cognitive complexity and the effective source of stimulation (extraversion) are both necessary in order to predict preference for complexity.

Utilizing such an hypothesis, Bryson and Driver (1972) have attempted to relate stimulus complexity preference among introverts to their level of cognitive complexity. They offered an elaboration hypothesis concerning the

relationship between cognitive complexity and preference for simple stimuli: "One reason for this may be that complex persons tend to elaborate the inputs that they receive... complex and simple persons may react to the same stimulus differently , with complex persons perceiving it as more complex psychologically" (pp. 325-326). That is, simple subjects may view a physically simple stimulus as an object or a form per se, and respond to it on a simplistic level. Complex subjects, on the other hand, may perform cognitive transformations upon the stimulus, thus endowing it with greater psychological complexity. For example, a simple rectangle may be transformed intc an intricate painting, a novel, or a musical score- or all of these and more.

Bryson and Driver's elaboration hypothesis states that cognitively complex people tend to elaborate the stimulus input they receive, in order to perceive it as more complex psychologically. In order to extend and possibly verify this elaboration hypothesis, it is necessary to attempt to evaluate the kind of cognitive manipulation that is taking place in the elaboration process. If we assume that the determination of word usage occurs cognitively, we can reasonably use words as stimuli and then compare the responses to these stimuli in order to determine if there are differences in cognitive processing. Using words as stimuli is not meant to imply that the experimental interest is in the complexity of the words themselves; rather, the attempt is tc determine the complexity of the response.

Using words which have a low percentage of usage in a given form-class, and accepting the implication that a low-frequency usage is an uncommon usage, it is then possible to assess the relationship of certain individual difference measures with any observed predisposition to common or uncommon responding. Uncommon responding may be taken to be indicative of cognitive elaboration in the present paradigm if it is assumed that a high frequency (common) response has a higher probability of being generated in the cognitive field than a low-frequency response. In order for an individual to emit an uncommon response, he or she would then have to suppress the common response in favour of an uncommon response. The present study is an attempt to examine first the existence of such a predisposition, and second its relationship to individual difference measures.

Upon receiving stimulation, an individual with an uncommon response tendency will (under the elaboration hypothesis) attempt to expand upon simple stimulus input in order to make it more complex psychologically. Cognitive manipulation of words occurs in an attempt to make the cognitive representation of the words more elaborate. For the introvert, this manipulation is rewarding, due to his tendency to respond better to internal stimulation (ie, cognitive representations and transformations).

It was hypothesized in the present study that cognitive complexity relates to the elaboration of stimulus input,

such that cognitively complex individuals tend to elaborate stimulus input more than cognitively simple persons. Since this tendency appears to depend for its actualization upon the effective source of stimulation, level of extraversion must be taken into account.

In order to test this hypothesis, it was predicted that the cognitively complex introverts (defined as those introverts scoring above the mean according to Schroder's et. al. (1967) rating system for Asch's Impression Formation Test (IFT), yielding indices of integrative complexity), would respond to stimulus words of low ambiguity by elaborating the input, including a rejection of the obvious (ie., high frequency usage) definition in favour of a more obscure and complex meaning, which for them has greater psychological complexity. The cognitively simple introverts (those scoring below the mean on the same rating scale) would react to the same stimulus words in an unelaborate manner, accepting and offering the more obvious, high frequency usage definition.

One possibility, suggested by Bryson and Driver (1972), is that extraverts fall as a group in a cluster between the cognitively complex and the cognitively simple introverts. Figure 1 illustrates this.

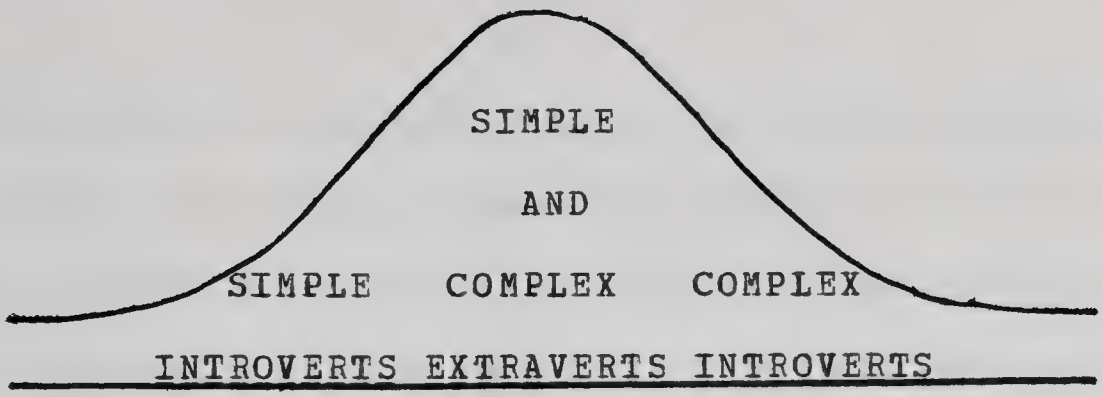

Figure 1 : Relationship between cognitive complexity, extraversion and definition set.

Extraverts have a characteristic orientation to action (Eysenck, 1947) and sensation- seeking (Bone and Montgomery, 1970; Farley and Farley, 1970). Eysenck's (1947) behavioural descriptions of extraverts and introverts showed a tendency for the extravert to display greater behavioural activity, the introvert greater "cerebral" activity. It is assumed from these findings that the extravert is so attuned to external stimulation that he will not only seek out situations in which he will receive external stimulus input (sensation-seeking), but also act upon or manipulate the environment in order to attain maximal input (activity and action-orientation). Behavioural activity observed among introverts does not necessarily counter this assumption, as the effect may be totally different. Such activity as long distance running engaged in by introverts may have the purpose of providing internal stimulation by focussing cortical activity upon such concepts as endurance,

competence and achievement. Similar activities engaged in by extraverts may have the purpose and effect of varying external stimulation through increasing interaction with external stimuli (which may include physiological input such as pain). A necessary assumption for the above interpretation is that the same activity may be engaged in for different purposes and/or with different effects.

The differentiation of English words into the form-classes of noun and verb has as its basis whether the word is conveying action or state of being as opposed to the subject or object of such action or state of being. When one attempts to classify verbs as being action-oriented words, one encounters the obvious difficulty of connotation, whereby any word, regardless of form-class, may have acquired an action orientation. It was necessary in the present study to largely ignore this difficulty, functioning on the simplistic assumption that verbs carry more of an action connotation in general than do nouns. For the restricted word sample of this study, that assumption may be more defensible than it is for the entire English language.

It was predicted that the hypothesized tendency of the extravert to seek environmental activity to the extent of environmental manipulation would lead to his or her bending the usage of highly ambiguous words to their verb form-class. That is, from the hypothesis that extraversion relates positively to orientation to an action-packed or stimulus-full environment, and that this action orientation

pervades the response repertoire of the extravert, the prediction was drawn that extraverts would prefer, classify and define words of high ambiguity as verbs more frequently than would the introverts.

Extraverts tend to be quicker in responding to the simple Stroop cards, ie., those without colour-word conflict (Bone and Eysenck, 1972). Davies (1967) also found that her introverted subjects showed greater colour-word interference on the conflicting items of the Stroop test. This may relate to the hypothesized tendency of the extravert to not integrate cognitive accretions with the stimulus input. If the extravert responds primarily to the external stimulus input, he would be expected to respond more rapidly than the introvert, who attempts to integrate cognitive manipulations of the stimuli. This interpretation rests on the assumption that an individual response follows the completion of cognitive processing at a definite and fairly stable time interval.

As with the Stroop test, then, the ambiguous words in this study should result in longer classification reaction times (RT) for introverts than for extraverts.

Another personality variable with cognitive aspects which may affect word usage strategy is neuroticism. Eysenck, in a study of the Rorschach responses of neurotics, found that they tended to make uncommon responses, as compared to average frequency responses of the population (in Cattell, 1965). The present study has attempted to

assess the generality of this phenomenon by extending it to the linguistic domain. A rationale for the hypothesis that neuroticism relates positively to the tendency to make uncommon responses to ambiguous stimuli is possible if we assume that neuroticism is on a dimensional continuum which runs from "normal" to "psychotic". One of the defining characteristics for this continuum is the degree of reality contact exhibited in an individual's responses, with normal responses showing strong contact with reality and abnormal responses approaching the realm of the psychotic as they become progressively more bizarre. If we can assume further that uncommon responses, due to their low statistical probability, tend in the direction of the bizarre on the continuum, we can then postulate that the tendency of neurotics to give uncommon responses is related to their tendency toward abnormal behaviour.

The application of this argument in the present study draws heavily on the relationship of Eysenck's neuroticism scale with clinical neurosis. While the relationship is neither perfect nor fully reciprocal, clinically neurotic subjects do tend to score highly unstable on the neuroticism scale of the EPQ.

If the present study supports the hypothesis that neuroticism is in a positive relationship with uncommon response frequency, then it will add support to the contention that an underlying component of Eysenck's neuroticism scale is clinically neurotic behaviour.

It was predicted that subjects high on the neuroticism dimension would offer the uncommon responses on the tasks of word classification, usage preference and sorting more frequently than stable subjects.

Anxiety is a strong component of the personality of individuals who are highly unstable on the neuroticism dimension (Cattell, 1973). Since high levels of anxiety interfere with performance on some tasks, according to the Yerkes-Dodson law (Radford and Kirby, 1975), it was predicted that subjects highly unstable on the neuroticism dimension would have longer classification RTs than stable subjects.

Since intelligence is a factor in the multiple definition of polysemous words (Young, 1969), it was expected that irtelligence quotients would correlate positively with the frequency of perception of form-class ambiguity.

The predictions outlined in the preceding discussion are summarized in the following table (Table 1).

1. Cognitively complex introverts will give uncommon responses to words of low ambiguity more frequently than will cognitively simple introverts or extraverts as a group.
2. Extraverts will classify words of high ambiguity as verbs more frequently than will the introverts.
3. Introverts will have longer reaction times (on tasks one and two) than extraverts.
4. Unstable (high neuroticism) subjects will give uncommon responses to words of low ambiguity more frequently than will stable subjects.
5. Unstable subjects will have longer reaction times (on tasks one and two) than stable subjects.
6. Slosson intelligence quotients will correlate positively with frequency of perception of form-class ambiguity.

Table 1. Summary of a priori predictions.

II. METHOD

Subjects

Undergraduate students enrolled in Introductory Psychology and Psychology of Personality at the University of Alberta were employed as subjects. They were selected from a pool of 764 students. This pool was established using 654 students from the mass testing program of the psychology department, and 110 from in-class testing. In-class testing occurred during the semester as part of a learning experience.

The Eysenck Personality Questionnaire (EPQ) was administered to all 764 students. Results were scored for psychoticism, extraversion, neuroticism, and on a lie scale.

A quadrant system was established using the two variables of extraversion and neuroticism, and subjects were placed on the grid formed according to their scores on these dimensions. The twenty-fifth and seventy-fifth percentile points were used as approximate cutoff scores for the quadrant analysis. Individuals scoring below the 25th or above the 75th percentile points on both extraversion and neuroticism were placed in one of these four groups:

- stable introvert
- stable extravert
- unstable introvert
- unstable extravert

This classification scheme is that of Eysenck and Rachman (1965).

	≤25 E	≥75 E
<25 N	Stable Introvert	Stable Extravert
>75 N	Unstable Introvert	Unstable Extravert

Table 2. Classification of subjects based on quadrant analysis of neuroticism (N) and extraversion (E) scores on the Eysenck Personality Questionnaire.

From the pool of classified students, individuals were contacted by telephone and invited to participate in the experiment. One hundred and twelve of these agreed and appeared for the study. One hundred and seven participated to fulfill ccurse requirements, and five were paid $3.00 for their participation. Eleven subjects were summarily discarded because of experimental and time difficulties which negated the reliability of their results.

Asch's Impression Formation test (IFT) was also administered to all subjects prior to the experimental session. For those subjects not tested in the mass testing

program, the IFT was administered at the end of the experimental session.

IFT responses were scored according to Schroder et. al. (1967), to yield indices of ecgnitive complexity. Trained raters independently assessed the responses cn a four-point scale. Inter-rater reliability was .44 . Raters had been trained using IFT responses of nonexperimental subjects to a reliability in excess of .60 . However, for the IFT responses of the experimental subjects, rater reliability dropped considerably. The significance of the relatively low ccefficient is lessened by the fact that it was obtained from scoring on a four-point rating scale. When subjects were broken down into high and lcw complexity classifications, effectively transforming the four-point scale to two-point, inter-rater agreement improved to 75% .

Subjects were tested individually. Where language facility was not apparent, the experimenter asked if English was the mother tongue of the subject. One individual was discarded on this basis.

Fifty-four subjects were female, and forty-seven were male. Of these 101 subjects, 18 were discarded because of incomplete data (due to time limitations); one was dropped because of extremely high EPQ lie scale scores; one was deleted because of neuroticism or extraversicnscores bordering on cutcff values; one was dropped because the procedure was nct kept double blind; and seven were discarded at random from three cells to equalize cell size.

This left four experimental groups of eighteen subjects each, on the dimensions of extraversion and neuroticism: 72 subjects in all. Equal numbers of male and female subjects obtained in each cell. Division on the basis of cognitive complexity necessitated the establishment of unequal cell sizes for testing the hypotheses relating to integrative complexity.

Words selected as stimuli were classified after Roydes and Osgood (1972). They defined low-ambiguity words as those obtaining 90% or more usage in either of two form-classes: high nouns with a usage of > 90% as nouns; high verbs with a usage of >90% as verbs. An extension of Roydes and Osgood resulted in a second classification consisting of words of high ambiguity. These were defined as obtaining 40 to 60% usage in either noun or verb form-class. Stimulus words were balanced for frequency of usage in the English language, and were drawn from West (1953; 1964). The classification scheme is outlined in Table 3.

	Nouns	Verbs
Hi Ambiguity	40-60	40-60
Lo Ambiguity	≧ 90	≧ 90

Table 3. Percentage usage in either form-class for ambiguity ratings.

Procedure

A. Experimental tasks

Four tasks comprised the experimental situation. The first three of these were administered in counterbalanced order, randomized across subjects; the fourth always followed (the single variable obtained from task four related to an hypothesis of secondary import). In addition, the Slosson Intelligence Test, a verbal short form of the Stanford-Binet Intelligence Scale, was given to all subjects at the beginning of the experimental session. This served as an introduction to the experimental situation and as a mental warmup.

The stimulus words used in each of these tasks were different: there were 155 words in all. Forty-five words were of high ambiguity, obtaining between 40 and 60% usage in either of noun and verb form-class. Sixty were of low ambiguity, with 30 having ≥90%usage as verbs and 30 having ≥90% usage as nouns. Fifty were of mixed ambiguity.

Task one required the subject to sort a pile of stimulus cards according to his or her judgment of its form class(noun or verb). There were 35 7.6x12.7 cm. white cardboard stimulus cards. Each card was printed on one side with one word, in 42 point lower case black type, geometrically centred. Words used were from four to five

letters in length. Fifteen of the stimulus words were of high ambiguity, and 20 were of low ambiguity. Of the low ambiguity words, 10 were of high noun usage and 10 of high verb usage.

The cards were presented in a predetermined randomized sequence. The task was introduced as a test of speed of judgment. Sorting on the basis of first impressions was requested. The experimenter timed the task electronically. The top card on the pile to be sorted contained the instructions, which were also read aloud by the experimenter. The bottom card was pink, as a cue to the experimenter to stop the timer.

Two mimeographed sheets were then provided, one for verb judgments and one for noun choices. Seven-point rating scales were printed on the sheets. The subject was requested to enter his or her choices from the sorting task on the appropriate sheets, with confidence ratings for these choices to be marked on the scales beside each word.

Task two involved speeded decision of form class for each of 35 four- to five-letter stimulus words (15 of high ambiguity and 20 of low ambiguity as in task one).

These were presented by slide projection. Slides were prepared using an IBM Selectric typewriter, with a ten-pitch typeball, copied into slide form by Thermofax processing. The stimulus words were projected onto a white, 28 x 39.3 cm. screen. The screen was approximately at eye level, and was located about 2.2 metres directly in frcmt of the seated

subject. Letter height as projected was 2.5- 3.8 cm, depending cn letter type (a vs. b). The display of each word started a timer with .1 second resolution, which was in turn stopped by the subject's response. Two switches were available to the subject, one marked NOUN and one marked VERB. The words were presented in predetermined random sequence, and the subject was required to respond to each in turn. After each response, the experimenter recorded the choice of form class and the RT.

Task three was a simple sentence composition test. Again, 35 stimulus words were used. Fifteen were of high ambiguity and 20 of low ambiguity. They were from four to five letters long. Their sequence randomized, they were listed on a mimecgraphed sheet, and the subject was asked to use each of them in a separate sentence of his or her own composition. These were rated by the experimenter for form class, using contextual clues. The reliability of these judgments was verified by having another rater perform spot checks and form judgments. Agreement was 100%.

The three experimental tasks outlined above were devised to allow assessment of the generality of any findings. While the numbers of verbs and of uncommon usages offered comparable scores for all three tasks, the nature of the different approaches was such that certain variables were only scorable for a given task. For example, sorting task time is cnly appropriate for the sorting of task one, and reaction times could only be recorded where the task

used apparatus compatible with such recording.

Task four utilized a list of a further 50 words, to facilitate correlational analysis with IQ's. These words varied in ambiguity level. The subject was required to classify each word as noun, verb, or both noun and verb by checking the appropriate space beside each word on the list. The sole purpose of this task was to determine the extent to which subjects, at the end of the experimental session, perceived the ambiguity of certain stimulus words.

B. Data processing

Scoring resulted in 24 experimental data points for each subject. Responses to words of high-ambiguity were classed as nouns or verbs, and the number of verb choices was taken as a score for each of the first three tasks. For words of low ambiguity, choice of the less common usage was scored for each of the first three tasks. The total number of verb choices (across levels of ambiguity) in each task was also scored. The number of uncommon choices, verb choices to highly ambiguous words, and total verb choices were summed across tasks one through three.

For task one, average confidence ratings for verb, noun, common and uncommon choices, were determined. For task two, average reaction times were calculated for each of noun, verb, common and uncommon choices. Task time was recorded. Overall average confidence ratings and reaction times were tabulated.

The number of "both noun and verb" responses on task four was taken as an index of perception of ambiguity. Pearson correlation coefficients were calculated for this perception of ambiguity index with the obtained SIT IQ's., both overall and for each sex separately.

While there was no missing data per se, eight of the seventy-two subjects produced one empty data point each, and one subject produced two empty data points. Nine empty data pcints occurred for confidence ratings where the number of words placed in a given classification was zero, and one empty data point occurred in a similar fashion for reaction times.

Due to the nature of task one, if none of the highly ambiguous words were placed in the verb classification, for example, the verb score would be zero; however, there would be no applicable score for verb confidence ratings. This resulted in an empty data point. The empty data point for reaction time on task two occurred analogously.

To facilitate statistical analysis, subject means for the values of that task were substituted for the non-available data. A preliminary set of ANOVA's was run using cell means rather than subject means, and results were not appreciably altered. It was felt that the use of subject means was more logically defensible, since these scores were closer to what would be expected based on the subject's other scores and on the trends of other subjects. Use of cell means introduced greater within-subject variation than

did use of subject means.

Separate 2^4 ANOVA's were run on all 24 experimental data point variables.

A secondary set of factorial ANOVA's were run on all 24 experimental data points to test for possible order effects.

Separate *t*-tests were run to test for differences in reaction times in the various response classifications of task two, across all subjects.

III. RESULTS

A. A priori hypotheses

For uncommon response frequency on task two, a significant two-way interaction between extraversion and cognitive complexity was obtained ($F(1,56)=4.418$, $p<.05$). The same interaction was not significant on tasks one and three, and it also failed to reach significance on the overall combination of the three tasks. On task two (slide projected stimuli), the introverts of low complexity made significantly more uncommon choices than did the other three groups.

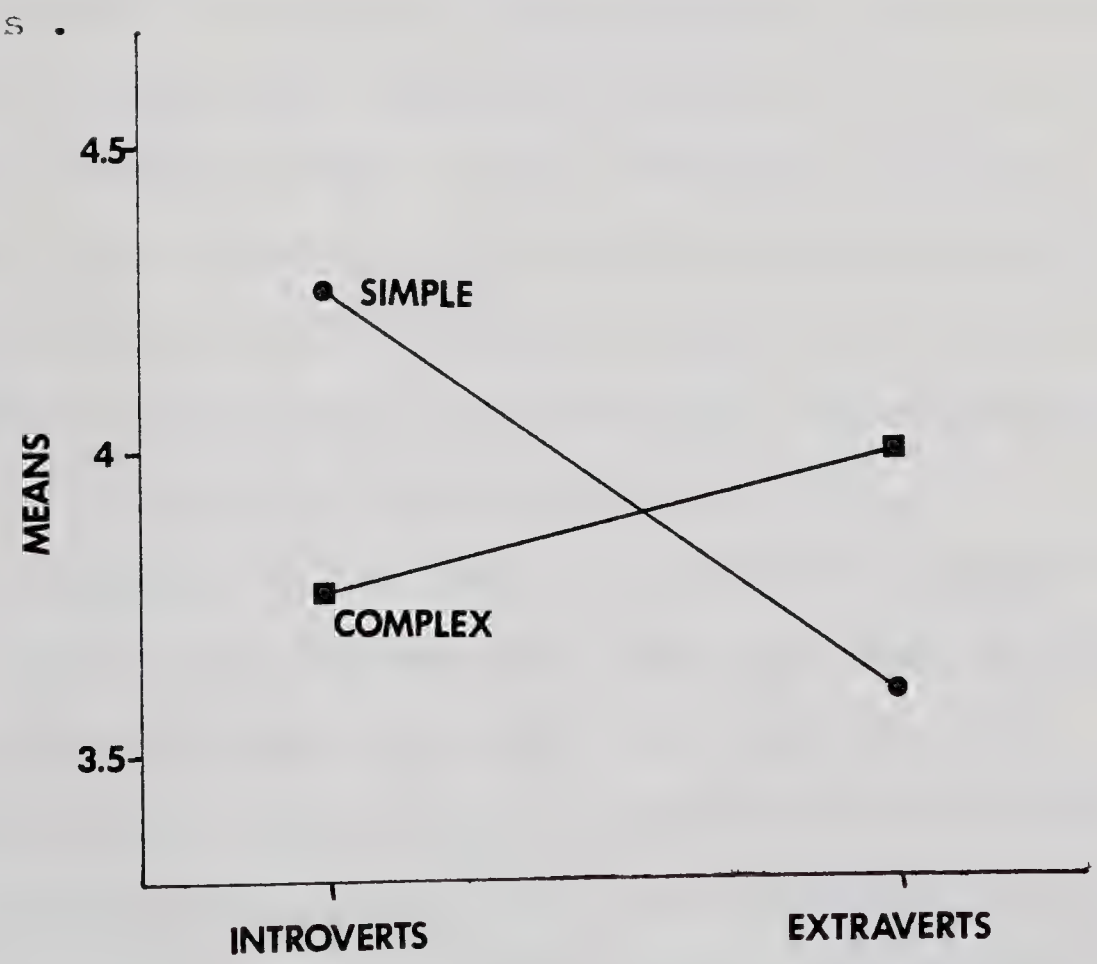

Figure 2. Interaction of extraversion and cognitive complexity for uncommon choices with words of low ambiguity.

Extraverted subjects of low complexity made fewer uncommon choices than their introverted counterparts, while extraverted subjects of high complexity made slightly more uncommon choices than the simple introverts. These results are contrary to the hypothesis that complex introverts would make uncommon choices more frequently than the simple introverts or the extraverts.

With tasks one, two and three taken individually and together, there were no significant differences between extraverts and introverts in frequency of verb classification of words of high ambiguity. This finding fails to support the hypothesis that extraverts would more frequently define words of high ambiguity as verbs.

The prediction that classification RT would be longer for introverts than for extraverts was not verified: no significant differences were found for the extraversion factor or for any of its interactions.

Differences in the number of uncommon responses based on the neuroticism factor were found. On task two, the main effect of neuroticism ($F(1,56)=3.12$, $p=.083$), the interaction with extraversion ($F(1,56)=3.347$, $p=.073$), and the three-way interaction with sex and extraversion ($F(1,56)=3.646$, $p=.061$) all approached significance. On task one, the interaction of neuroticism and cognitive complexity reached significance at the .05 level ($F(1,56)=4.017$). No

significant results were obtained on task three.

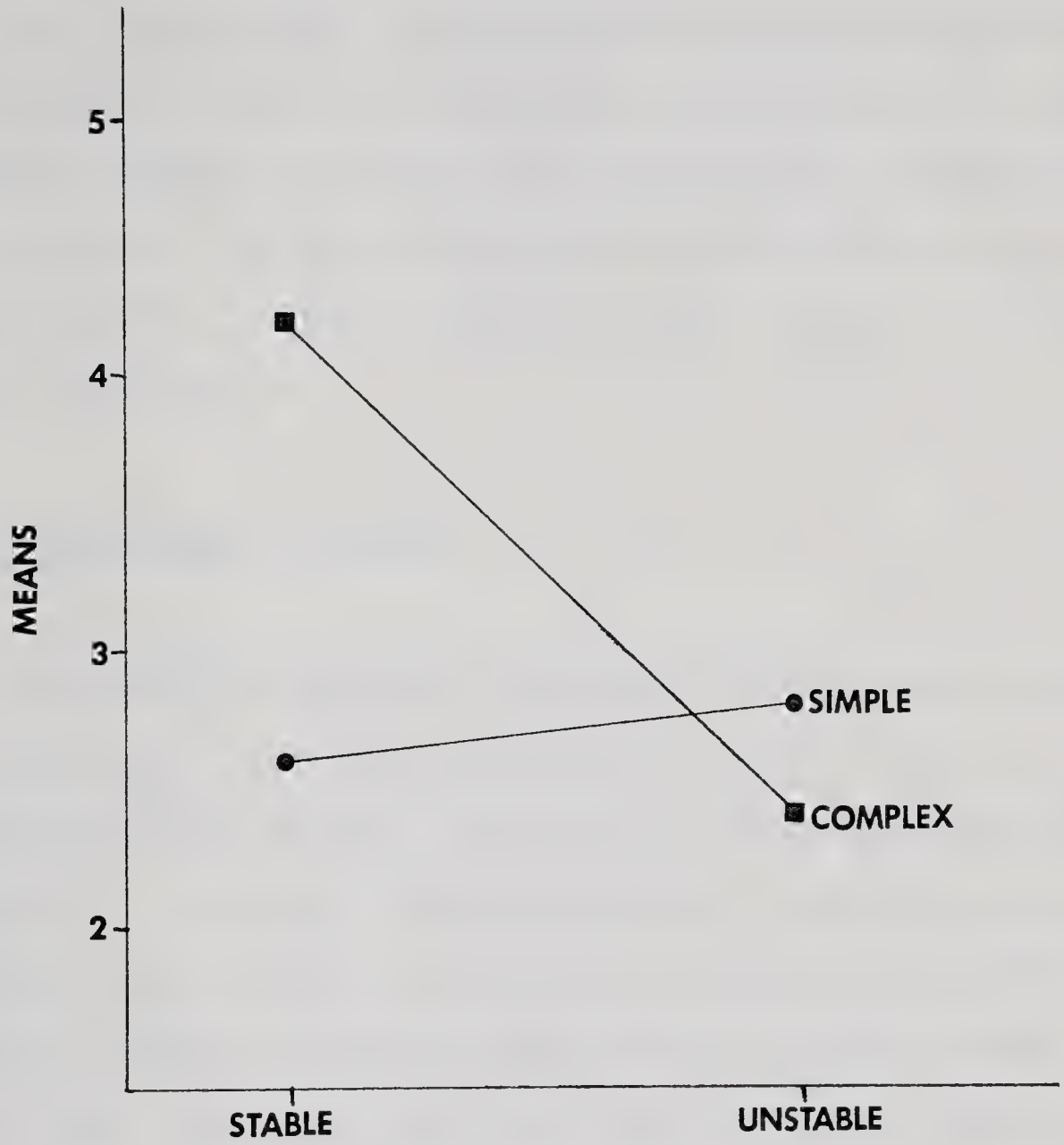

Figure 3. Neuroticism by complexity interaction for uncommon responses on task one.

The main effect of neuroticism was such that unstable subjects made more uncommon responses than did stable subjects. These results tend to support the hypothesis that neurotic subjects would make a greater number of uncommon

responses than stable subjects.

There were no significant differences in classification reaction times for the neuroticism factor.

SIT intelligence quotients correlated positively with the index of ambiguity perception ($r=.3264$, $p<.005$). This directly supports the hypothesis that such a relationship would obtain. For female subjects, the obtained correlation rose to .5144 ($p<.005$), while for male subjects, it was .1422 ($p<.204$).

B. Of incidental findings

Cognitive complexity produced a significant effect in the confidence ratings attributed to common choices ($F(1,56)=4.979$, $p<.05$). Further, the effect of cognitive complexity approached significance for confidence ratings on noun ($F(1,56)=3.151$, $p=.081$) and verb ($F(1,56)=3.348$, $p=.073$) choices for ambiguous stimuli, as well as for the total task confidence ($F(1,56)=3.418$, $p=.070$). Examination of the means showed that subjects of high cognitive complexity gave higher confidence ratings than subjects of low complexity in each of the above cases.

None of the main effects for sex were significant at the .05 level. Unstable subjects took more time to complete the card sorting of task one than did the stable subjects ($F(1,56)=4.182$, $p<.05$).

Extraverts expressed more confidence in their uncommon

classifications than did introverts ($F(1,56)=4.14$, $p<.05$), on task one.

For the classification of words of high ambiguity as verbs on task one, the three-way interaction of sex, extraversion and complexity was significant at the .05 level ($F(1,56)=5.739$).

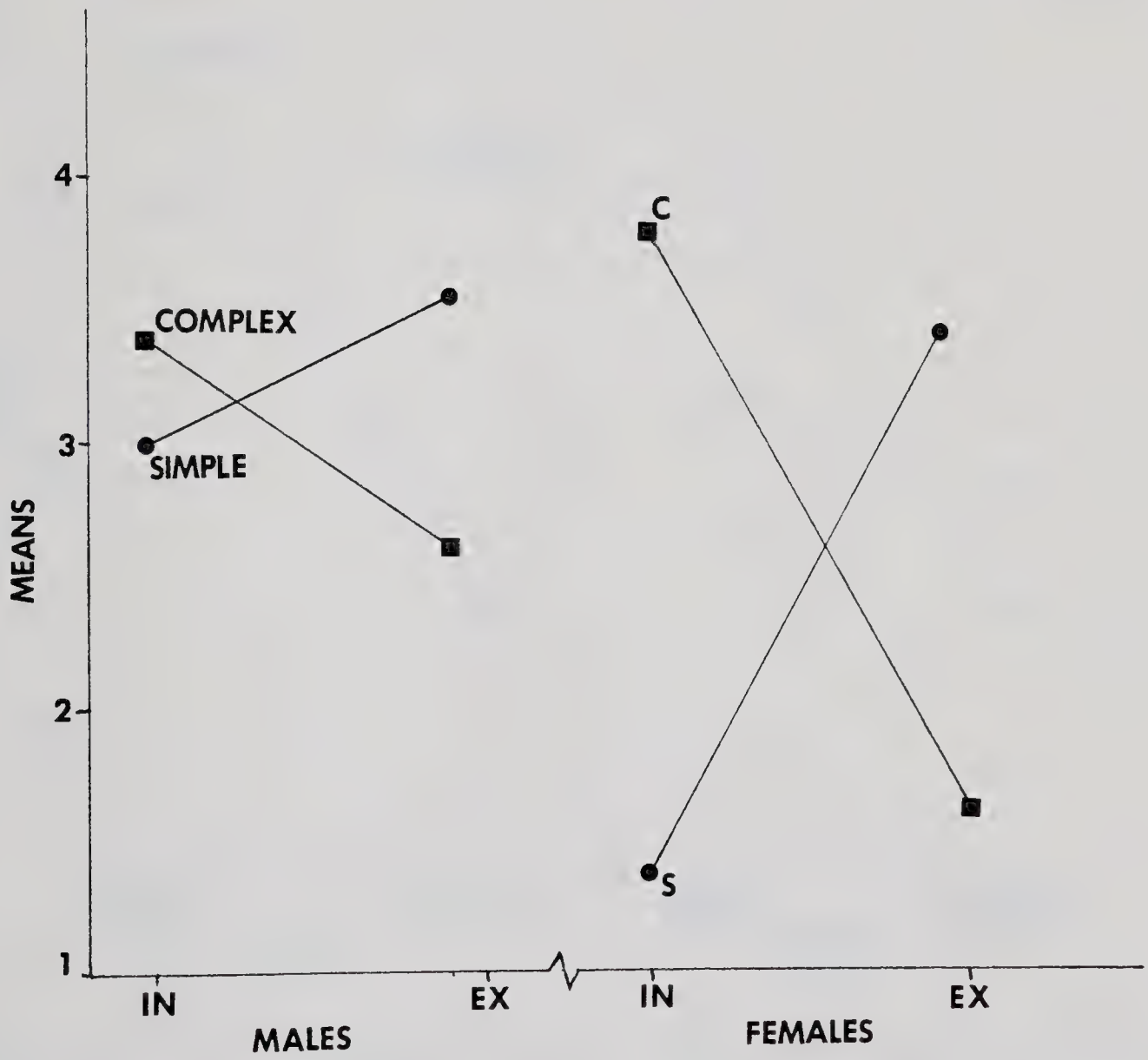

Figure 4. Sex by complexity by extraversion interaction for verb choices of highly ambiguous words, task one.

Sex, neuroticism and cognitive complexity produced a significant three-way interaction on the sorting time for task one ($F(1,56)=5.258$, $p<.05$).

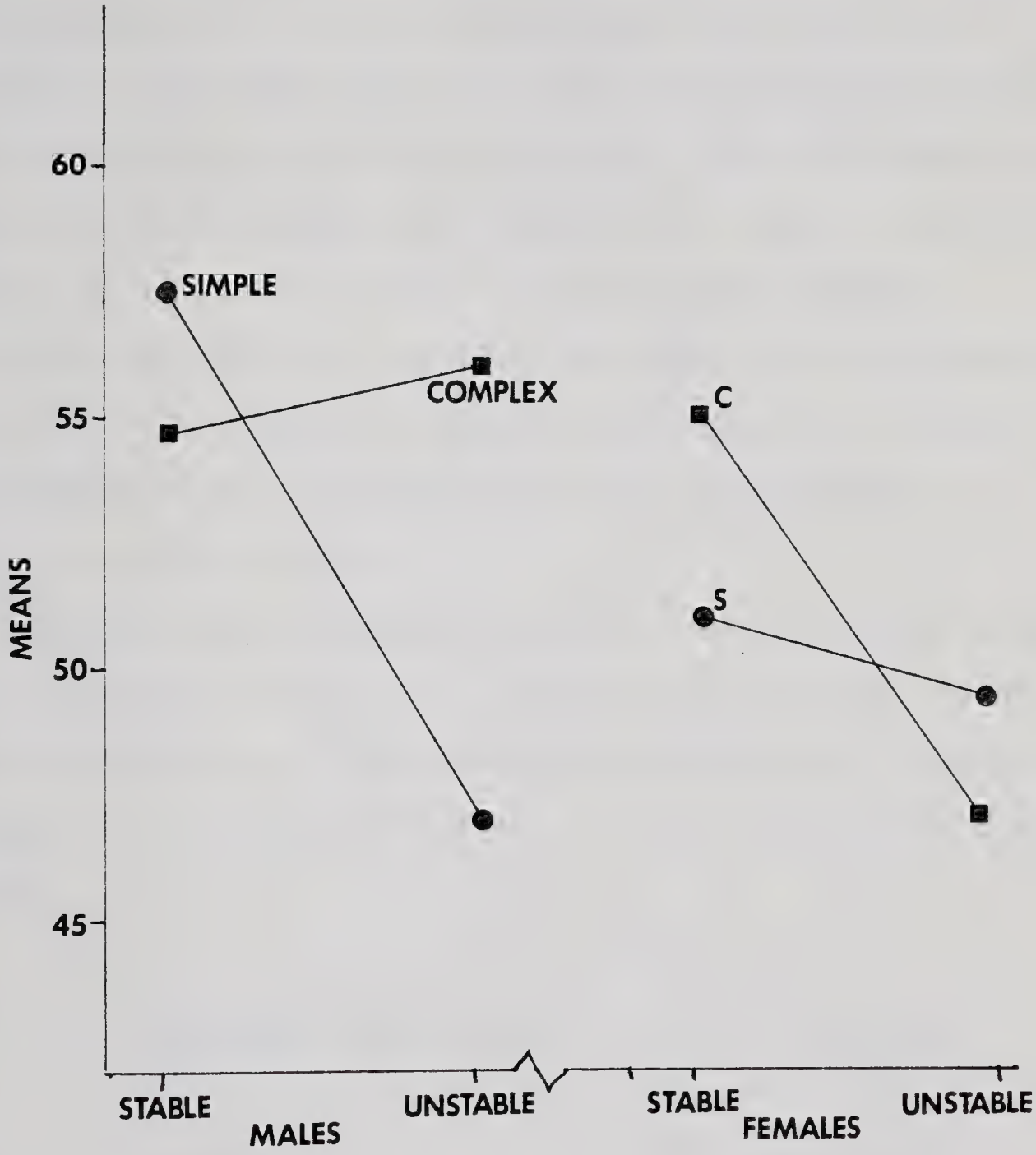

Figure 5. Sex by neuroticism by complexity interaction for elapsed time on task one.

No four-way interactions were significant.

Order had a significant main effect on the variable of

task time on task one ($F(5,31)=3.131$, $p<.05$). The main effect for order was significant also for the three-task total of verb classifications of highly ambiguous words ($F(5,31)=2.895$, $p<.05$)>. For this same variable, the interaction of order and neuroticism was significant ($F(5,31)=2.636$, $p<.05$), as was the three-way interaction of extraversion, neuroticism and order ($F(4,31)=3.206$, $p<.05$). The same interactions were significant for the three-task total of all verb choices, reflecting the obvious relationship between the two variables. For the neuroticism by order interaction, F $(5,31)=2.723$ $(p<.05)$, and for the extraversion by neuroticism by order interaction, $F(4,31)=2.752$ $(p<.05)$.

Significant three-way interactions with order occurred for confidence ratings in task one, with respect to verb, common, and overall choices. All of these were interactions of sex, neuroticism and order, and are summarized in table four.

Variable	Interaction	F-value	d f	p-value
Verb C.R.	S x N x O	3.173	4,31	.027
CommonC.R.	S x N x O	4.053	4,31	.009
Total C.R.	S x N x O	2.770	4,31	.045

Table 4. Interactions of sex (S), neuroticism (N), and order (O) on three variables.

In task two, extraversion, neuroticism and order produced significant three-way interactions in the number of verb classifications of highly ambiguous words ($F(4,31)=2.928$, $p<.05$), and in the total number of verb choices ($F(4,31)=3.307$, $p<.05$).

A significant three-way interaction of order, extraversion and neuroticism was obtained in the reaction times to verb classifications for task two ($F(4,31)=2.703$, $p<.05$).

Neuroticism and order produced interaction effects significant at the .05 level in task three. For the number of highly ambiguous words classed as verbs, the F-ratio was 2.575; while for the number of verb choices across levels of ambiguity, it was 3.448, both with 5 and 31 degrees of freedom.

Reaction times when subjects responded in the common direction were significantly lower than when responses were in the uncommon direction (t (71df)$=3.52$, $p<.001$).

Significant coefficients of correlation are reported in tables 5 through 13.

	PSYK	VAl	NCR	VTT	IQ
SEX				-.3239	
NEUR	.3681				
ORDER		.3910		.3133	
PERC			.3068		.3264

Table 5. Correlation coefficients significant at the .005 level for sex, neuroticism, psychoticism, task order, perception of ambiguity, ambiguous words used as verbs, confidence ratings on nouns (task one), and total verbs (overall data).

	NRT	VRT	CRT	URT	TRT	VCR	NCR	CCR	UCR	TCR
NRT	1.0000									
VRT	.8079	1.0000								
CRT	.8620	.8395	1.0000							
URT	.7665	.7532	.7563	1.0000						
TRT	.9270	.9337	.9325	.8497	1.0000					
VCR						1.0000				
NCR				-.3129		.5567	1.0000			
CCR						.7236	.7071	1.0000		
UCR						.4223	.4895	.4296	1.0000	
TCR						.7781	.8472	.8904	.6631	1.0000
TIME1								-.3222		-.3632

Table 6. Correlation coefficients significant at the .005 level for confidence ratings and elapsed time on task one and reaction times on task two (overall data).

	VT1	VA1	UNC1	VT2	VA2	UNC2	VT3	VA3	UNC3	VTT	VAT	UNCT
VT1	1.0000											
VA1	.9148	1.0000										
UNC1			1.0000									
VT2	.5499	.5102		1.0000								
VA2	.4904	.4296		.9215	1.0000							
UNC2			.5936			1.0000						
VT3				.3415	.2740		1.0000					
VA3				.3088			.9241	1.0000				
UNC3						.3580			1.0000			
VTT	.7843	.7405		.8480	.7599		.6613	.6165		1.0000		
VAT	.7656	.7859		.7863	.7469		.6623	.6654			1.0000	
UNCT			.8076			.8292			.6845			1.0000

Table 7. Correlation coefficients significant at the .005 level for total verb choices, ambiguous words used as verbs, and uncommon choices for each of the three tasks and the three-task total (overall data).

	VT1	VA1	UNC1	VT2	VA2	UNC2	VT3	VA3	UNC3	VTT	VAT	UNCT
VT1	1.0000											
VA1	.9082	1.0000										
UNC1			1.0000									
VT2	.5864	.5681		1.0000								
VA2	.5262	.4597		.9018	1.0000							
UNC2			.3532			1.0000						
VT3				.3221			1.0000					
VA3							.9025	1.0000				
UNC3						.4039	-.2898	-.3012	1.0000			
VTT	.8014	.7421		.8716	.7713		.5670	.4873		1.0000		
VAT	.7678	.7652		.8220	.7543		.5875	.5500		.9669	1.0000	
UNCT			.7265			.7787		-.4155	.6644			1.0000

Table 8. Correlation coefficients significant at the .05 level for total verb choices, ambiguous words used as verbs, and uncommon choices for each of the three tasks and the three-task total (data drawn from female subjects).

VT1			.2933				
VA1					.3582		
UNC1				.3186			
TIME1					.4478	-.3586	
NCR						.5285	
CCR				.2924	-.2808	.2813	
UCR			.3184				
TCR						.4093	.2780
VT2			.2941			-.3125	-.2972
NRT					.2982	-.3237	
CRT	.3063					-.3080	
URT						-.4182	
TRT						-.3699	
VA3							.2975
VTT			.3041				
VAT							.3777
IQ						.5144	1.0000
	EXTR	NEUR	PSYK	COMP	ORDER	PERC	IQ

Table 9. Miscellaneous coefficients of correlation with extraversion, neuroticism, psychoticism, cognitive complexity, task order, perception of ambiguity and IQ. (data drawn from female subjects). p= .05 .

PERC	-.2816	1.0000					
VT1				.3051		.4691	
VA1				.4073		.3935	
TIME1	-.2888					.4081	
VCR						.3540	
NCR	-.2833					.3740	
CCR						.4100	
UCR	-.4450					.3491	
TCR						.4043	
VT2				.2981			
UNC2		.3092					
NRT					-.2864		
VRT					-.2925		
CRT			-.3052			.4770	
URT						.4418	
TRT					-.2928	.4360	
VT3				.5009		.3803	
VA3				.5215		.3005	
VTT				.4429		.4611	
VAT				.4945		.3976	
IQ	-.2998					1.0000	
	NEUR	PSYK	COMP	ORDER	PERC	IQ	

Table 10. Miscellaneous coefficients of correlation with neuroticism, psychoticism, cognitive complexity, task order, perception of ambiguity, and IQ, significant at the .05 level (drawn from male data).

NRT	1.0000										
VRT	.8554	1.0000									
CRT	.8641	.8408	1.0000								
URT	.7555	.7906	.7085	1.0000							
TRT	.9439	.9434	.9142	.8496	1.0000						
VCR						1.0000					
NCR				-.3489	-.3337	.5488	1.0000				
CCR						.7129	.7419	1.0000			
UCR						.3867	.4819	.4080	1.0000		
TCR						.7198	.8746	.8396	.6992	1.0000	
VT3	-.3688	-.2882			-.2890						
VA3	-.2832						-.4674	-.3422	-.5059	-.5382	.5579
TIME1											
	NRT	VRT	CRT	URT	TRT	VCR	NCR	CCR	UCR	TCR	UNC1

Table 11. Correlation coefficients significant at the .05 level for confidence ratings and elapsed time on task one and reaction times on task two (data drawn from female subjects).

	NRT	VRT	CRT	URT	TRT	VCR	NCR	CCR	UCR	TCR
NRT	1.0000									
VRT	.7524	1.0000								
CRT	.6216	.6412	1.0000							
URT	.6416	.5900	.8948	1.0000						
TRT	.6794	.7153	.9839	.8948	1.0000					
VCR						1.0000				
NCR			.3469		.3202	.7875	1.0000			
CCR			.3519		.3244	.8617	.8416	1.0000		
UCR	-.2966					.5872	.6957	.6326	1.0000	
TCR			.3236		.3028	.9070	.9142	.9724	.7309	1.0000

Table 12. Coefficients of correlation significant at the .05 level for reaction times in task two and confidence ratings in task one (data drawn from male subjects).

	VT1	VA1	UNC1	VT2	VA2	UNC2	VT3	VA3	UNC3	VTT	VAT	UNCT	TIME1
VT1	1.0000												
VA1	.9103	1.0000											
UNC1			1.0000										
VT2	.5298	.4694	.4519	1.0000									
VA2	.4832	.3915	.4592	.9359	1.0000								
UNC2			.7955			1.0000							
VT3	.5829	.5859		.4820	.4772		1.0000						.3639
VA3	.5522	.5735		.4686	.4726		.9494	1.0000					
UNC3		-.3593	.3995		.2942	.3138			1.0000				
VTT	.8465	.7776	.3341	.8094	.7698		.8295	.7889		1.0000			.3765
VAT	.8069	.8185		.7618	.7541		.8375	.8492		.9634	1.0000		.3105
UNCT			.8904	.4642	.4997	.8352			.7156	.2895		1.0000	
NRT			-.3919			-.3783			-.2886			-.4287	.3522
VRT			-.3569			-.4810						-.4452	.2841
CRT	.4362	.4211				-.3587	.3953	.3205		.3801	.3399		.6178
URT	.3855	.4154	-.2780			-.4391	.3777	.3029		.3324	.3021	-.2893	.5189
TRT	.4267	.4128				-.3494	.3677	.2949		.3828	.3401		.6130
VCR	.4312	.3072	.4308	.3858	.4747	.4489	.3082	.3269	.4212	.4729	.4081	.5740	
NCR	.4785			.2793	.3353	.2821	.3941	.3811	.2951	.4833	.4226	.3921	.3342
CCR	.4678		.2864		.3504		.3775	.3597	.3110	.4762	.3939	.4103	
UCR	.3485		.3025	.3290	.3934	.4381			.2810	.3897	.3036	.4440	
TCR	.4788		.3235	.3265	.3963	.3350	.3677	.3454	.3454	.3420			

Table 13. Coefficients of correlation significant at the .05 level for total verb, ambiguous words as verbs, and uncommon responses for three tasks and their totals, with confidence ratings on task one and reaction times on task two, and task time on task one (drawn from male subjects).

IV. DISCUSSION

A. Of a priori hypotheses

The results of this study fail to support the hypothesis, drawn from Bryson and Driver (1972), that elaboration of stimulation would be highest among individuals of high cognitive complexity, for whom the effective locus of stimulation was internal. The prediction that cognitively complex introverts would reject the more obvious usage of a word of low ambiguity in favour of a more psychologically ccmplex or obscure meaning was not verified. On the slide-projected stimulus task, the effect for introverts was in the direction opposite to that predicted, while for extraverted subjects, high complexity resulted in slightly higher frequencies of uncommon responses.

The fact that the effect here was in the opposite direction to that suggested by the hypothesis drawn from Bryson and Driver (1972) indicates that unccmmon word usage may not involve the same kind of cognitive activity as is drawn upon in preference judgments for physically complex stimuli. Usage of complex words as stimuli attempts to get at a more abstract, non-perceptual form of psychological complexity, in order to assess the nature of the hypothesized elaboration.

That a comparable effect was not found on tasks one and

three detracts from the reliability of this finding. However, that this effect was only apparent on the task using slide-projected stimuli may be due to the relative rigor of the experimental tasks. Task two was the most strictly ccntrolled, with accurate and constant stimulus presentations, and produced the most rapid responses. Mean response latency for task two was 1.08 seconds per word, while for task one it was 1.48 seconds per word. Task three, while not strictly timed, took from ten to forty minutes for 35 words, thus allowing for a vastly greater amount of interference with the immediate cognitive activity. Of the three tasks employed, results were thus the most immediate in time to the cognitive activity, and most closely represent cognitive set for this variable.

The implicit assumption that response latency is a critical variable in this research is supported by the finding that on task two, reaction times to words of low ambiguity were significantly lower when the common classification was used than when the uncommon classification was employed. This result suggests that more cognitive processing activity occurred when uncommon responses were selected. The hypothesis that an uncommon response represents cognitive elaboration is therefore strengthened by this finding.

Significant differences among tasks on the comparable variables of total verb choices, ambiguous words labelled as verbs, and uncommon usages, were not obtained. This detracts

from the argument that task two was the only technique which adequately tapped the extraversion/complexity interaction. The possibility that the statistically significant result was a product of chance can only be investigated through further research.

Taking the result at face value, however, a number of postulations are possible.

Complex introverts and extraverts produced approximately equal performances in frequency of uncommon usage. It may be postulated from this that higher levels of cognitive complexity negate the effect of one's level of extraversion on complex usage of the language. That is, introversion per se may dispose an individual towards an uncommon usage of a word (elaboration), but high cognitive complexity interferes with this predisposition in processing, perhaps by forcing a more complete survey of potential usages provided in the subjective lexicon and then equalizing response frequencies in common and uncommon categories. Alternatively, high cognitive complexity may impose a random selection from the available options, thus producing more or less equal response categories. Either approach may be a symptom of the complex individual's approach to language usage, namely an attempt to avoid a simplistic set or category in favour of variety. Varied language usage has been stressed in the traditional secondary school environment.

The preceding argument suggests that any inherent

tendency to elaboration may be confounded by special characteristics of language usage. Special training undergone by individuals, as in the educational system, may induce linguistic strategies which have the effect of overriding tendencies of cognitive complexity and/or extraversion, for the linguistic domain.

Cognitively simple introverts, however, appear to have a cognitive "set" which orients them towards the selection of a less common usage of a given word of low ambiguity: their response patterns strongly suggest this interpretation. This effect may well be due to the desire of the introvert to receive stimulation of the internal environment through mental manipulation of abstract stimuli. Freed of the mitigating influence of highly complex cognitive activity, the tendency is actualized. The extravert, on the other hand, responds in a simplistic fashion on an external level, choosing the simplest and most immediately available response. Without a high level of cognitive complexity, the extravert fails to integrate the options provided by the subjective lexicon .

This experimental finding lends credence to an assumption underlying the elaboration hypothesis; namely, that introverts tend toward cognitive manipulation of stimuli. Such cognitive manipulation is a theoretical necessity for psychological elaboration to occur, if indeed elaboration and cognitive manipulation do not involve the same process.

Using that assumption, it then becomes possible to view introversion as the necessary correlate of a tendency toward elaboration (rather than cognitive complexity, as Bryson and Driver (1972) have done), which tendency is actualized only in the absence of high cognitive complexity. Cognitive complexity can be seen as a modifying factor on the introvert's predisposition to elaboration.

Bryson and Driver's (1972) simple introverts, it will be recalled, preferred the complex stimuli, while complex introverts preferred the simple stimuli. Bryson and Driver labelled this finding counterintuitive, and by their reasoning it was. However, their results may be brought into line with the interpretation of the present findings if we regard preference for complex stimuli as indicative not of tacit acceptance of stimulation but of active elaboration. Bryson and Driver's study did not address the kind of elaboration engaged in in making preference judgments. Their implicit assumption appeared to be that more elaboration occurred with simple stimuli than with complex stimuli. The results of the present study question the accuracy of that assumption.

Complex stimuli may in fact induce or allow more extensive elaborations than simple stimuli. The Rorschach test relies heavily upon such an assumption in its rationale for the emplcyment of highly ambiguous stimuli. Ambiguity is assumed to allow freer rein to the imagination process, and elaboration as here defined must be closely related to, if

not dependent upon, imagination. An assessment of the relative ambiguity of Bryson and Driver's stimuli, it is suggested, would find a positive relationship between stimulus complexity and ambiguity.

Bryson and Driver's results, reinterpreted in this light, may be made to support an hypothesis that introverts tend toward cognitive manipulation and elaboration. The preference of the simple introverts for the complex stimuli may actually involve elaboration to a much greater extent than was hypothesized by Bryson and Driver for preference for simple stimuli by complex introverts. If cognitive complexity serves as a barrier to the actualization of the introvert's tendency toward elaboration, as was suggested earlier, then the cognitively simple introvert would be expected to actualize his or her tendency to elaborate more than the complex introvert.

Therein is the result of the present study supportive, for here the cognitively simple introverts gave evidence of elaboration by their observed tendency to use stimulus words in their uncommon classification.

In summary, it is suggested that introverts have a tendency toward elaboration of external stimulus input. While cognitive complexity somehow interferes with this predisposition, the tendency is actualized for cognitively simple introverts. This interpretation accords with the findings of both Bryson and Driver (1972) and the present study.

Failure to support the hypothesis that introverts would take longer to classify ambiguous words as nouns or verbs than would extraverts may have been due to the lack of conflict between the available responses. In Davies' application of the Stroop test, results of which suggested this hypothesis, stimuli are in strong conflict and only one response may be considered correct. Many of the subjects in the present study indicated that they recognized the conflict to be only apparent, and that many of the words could be used as either noun or verb. This is supported by the rather high mean of 32.03 out of a possible 50 for the index of perception of ambiguity (task four). With either response perceived to be essentially correct, cognitive conflict was minimized and the probability of a reaction time difference was greatly decreased.

Subjects in the two levels of extraversion in this study did not produce correspondingly separate levels of verb choice at any acceptable level of significance. There does not appear to be evidence, then, that individuals differentiate the action or external activity content of words in terms of noun or verb form-class. At least, any differentiation which may occur is not of sufficient magnitude to evoke the apparent preference of the extravert for action-oriented stimuli, as discussed earlier. One suggestion is that manipulation of abstract qualities of written material is so far removed from the activity that such material might represent, that the material loses its

connotations of action and more suitably satisfies the internal stimulaticn requirements of the introvert. At this point, the noun-verb difference loses import, and thus cannot differentiate extravert from introvert. A study of any differential value of verbs expressed in active versus passive voice might be revealing in this regard. If it could be demonstrated that active verbs are preferred by extraverts, the hypothesis that extraverts prefer action-oriented stimuli which imply stimulation change and variety would be extended to the linguistic domain.

Unstable subjects on the neuroticism dimension did differ from the stable subjects in the frequency with which they used the uncommon response category (task two). The difference was in the direction predicted: that is, unstable subjects used the uncommon response category more frequently than did stable individuals.

The failure of the other tasks to support this finding detracts from its generality. However, the fact that the finding directly supports an a priori hypothesis improves its respectability (and adds strength to the argument that task two most directly taps the cognitive activity underlying the decision-making procedure by demanding an immediate response).

The predisposition of neurotics to uncommon responses was predicated on Rorschach response categories. The present findings offer an extension to the generality of those findings. Neurotic subjects may have an across-the-board

preference for uncommon responses, particularly in a testing situation. Instructions with the Rorschach do not lead one to believe that there is any one correct response. Uncommon responses are in no way discouraged. In the experimental manipulations of this study, the forced-choice paradigm carried the implicit idea that one response was more correct than the other, although uncommon responses were not discouraged. In spite of the limitations of the forced-choice paradigm, neurotic subjects still used the uncommon response category more frequently than did stable subjects. The hypothesized tendency of the unstable subject to generate uncommon responses, perhaps due to his or her dimensional tendency toward bizarre behaviour, is supported.

For uncommon responses on task one (sorting), the significant interaction of neuroticism and cognitive complexity was due almost entirely to differences among the cognitively complex subjects. Simple subjects remained relatively stable across the two levels of neuroticism. Complex stable subjects gave more uncommon responses than the simple subjects, while complex unstable subjects gave fewer uncommon responses than the other three groups. For complex subjects, then, a postulated interference of an anxiety component is supported. For the simpler subject, the anxiety effect is clearly weak. This finding presents the idea that the greater integrative capacities of the complex subjects facilitated the assimilation of the anxiety component, thus decreasing the frequency of uncommon

response usage for the unstable subjects. Such an interpretation presumes that cognitively complex subjects use the uncommon response category more frequently than do simple subjects. The evidence produced by this study does tend in that direction, with an F-ratio of 1.573 (p=.215) on the same task.

Classification reaction times to the slide-presented stimuli of task two were not significantly different for the two levels of neuroticism studied. If characteristic levels of anxiety were high for the unstable subjects, they did not interfere with the reaction time of task performance. However, for the card-sorting of task one, unstable subjects took significantly more time than did the stable subjects. This task required the same cognitive decision-making activity as task two, but it contained a larger manual component. It is possible, then, that the interference of anxiety input occurs in the motor phase of processing, or even in the physiological mechanisms of physical response. This seems reasonable in light of the fact that anxiety increases physiological arousal, and the Yerkes-Dodson law meshes with these results. In task two, the physical performance component was minimal and lateralized. For confusion in physical responding to occur, interference would have to be gross. Task one required lateral as well as eye-hand co-crdination. Here a performance decrement was produced for the unstable subjects relative to the stable subjects, in terms of task time. This relates to Radford and

Kirby's (1975) report that the more complex the task, the lower the level of drive (anxiety) for best performance. That is, anxiety interferes to a greater extent with a more complex task.

These findings suggest that the interference of anxiety with the performance of unstable individuals occurs peripherally. No significant differences were manifested on task two, for which the physical aspect was minimal. (The mean differences which occurred by chance were evenly divided as to direction). The introduction of greater task complexity with a larger performance component in task one resulted in a decrement for the unstable subjects, probably due to the interference of anxiety.

The unstable subjects did perform more poorly than the stable subjects in terms of task time. Since anxiety is a large component of the personality of the unstable subject, and since high levels of anxiety are known to interfere to varying degrees with task performance (including response latency), it seems reasonable to postulate that the characteristically high levels of anxiety in unstable subjects were a factor in their poorer performance.

Further, Cattell (1965) reports that muscular efficiency is significantly lower in the more anxious person, and that muscular tension due to anxiety is greatest in the muscles of the neck and shoulder. This tension he relates to handwriting pressure. For the present study, the relation to efficiency in the hand-sorting task is readily

apparent.

The moderately positive correlation of SIT intelligence quotients with the index of ambiguity perception was as predicted. Generally, this suggests that intelligence is directly related to the ability to perceive verbal ambiguity. Such a finding is consonant with the heavily verbal component in most standard tests of intelligence.

The correlation for female subjects was much higher than it was for male subjects. This indicates that intelligence was a stronger factor in the perception of ambiguity for females than it was for males.

The correlation being nonsignificant for males obviously limits the generality of the result. It may be that the correlation is a chance finding among females, and that the very high correlation for female subjects is responsible for the significant overall correlation. Further investigation is necessary to assess the reliability of the correlation for females. If it then is verified, it may be interpreted to indicate that female subjects, although not necessarily superior in verbal manipulations to males, do attend more to the linguistic qualities of verbal stimuli than do males. In paying more attention to the stimuli, female subjects would be more likely to discover the ambiguity present in them. Alternatively, female verbal skills may be less subject to fatigue. This interpretation is suggested by the fact that the experimental task used to assess perception of ambiguity always followed the other

three tasks, at a point in the experimental session when maximal fatigue would be expected. These suggestions for hypotheses may be evaluated in future research.

B. Of incidental findings

That subjects of high cognitive complexity were generally more confident in their judgments (except where uncommon responses were concerned) reflects their superior integrative capacities. Schroder et al. (1967) tend to use the terms "cognitive complexity" and "integrative complexity" interchangably, and the criterion of import for classifying IFT responses as evidencing high or low complexity is the extent to which they integrate disparate and seemingly contradictory concepts.

Given time to consider the responses made, as was the case when confidence ratings were requested, complex subjects were able to integrate the alternatives suggested by cognitive input, reaching the conclusion with a high degree of confidence that their previous decision had been correct. Subjects low in cognitive complexity had more difficulty integrating the complex input, and were less confident that their choices had been correct. Future study in this area should ccntrol the complexity of the stimuli, the degree of accuracy required, and the time allowed for the integration of the input.

The fact that no significant differences were found

between the two sexes is interesting in light of the traditional assumption of female superiority in the use of verbal skills. It is evident that for the subjects in this study, either the experimental tasks did not tap verbal skills in a manner which would sufficiently differentiate the sexes, or the sexes do not actually differ in the level of verbal skills when age and biological maturity are controlled for. In defense of traditional interpretations, skills between sexes may have been minimized in the sample of college students used. The sample had a mean IQ of 126.43, with a standard deviation of 15.59. Subjects with intellectual abilities in the range thus indicated would be likely to have highly developed verbal skills regardless of sex.

The alternate interpretation is an indictment of "verbal superiority in females" theory. The tasks involved in the present study did tap a considerable range of verbal skill areas, yet the alleged superiority of female subjects was not apparent in the data. Perhaps the issue needs to be re-examined, both in the literature and through experimental research.

The higher confidence ratings offered by extraverts for their uncommon choices was a function of greater caution exercised by the introverts. While the following differences were not statistically significant, introverted subjects were an average 1.3 points (18.6%) less confident with their uncommon choices than with their common choices, while for

the extraverts, the decrease was only .8 points, or 11.4% . The relative lack of caution among extraverted subjects accords with the Eysenckian conception of the extravert as easygoing, carefree, optimistic and impulsive-- among other things (Eysenck and Rachman, 1965).

All confidence ratings were subject to a ceiling effect, due to the nature of the variable and the rating scale. Confidence ratings were generally very high, and any real differences between extraverts and introverts were necessarily minimized by the low ceiling. Only where the introverts became very cautious, on the uncommon classification, did the difference reach significance.Further research with higher ceilings, to allow freer rein to the extravert's hypothesized tendency to easygoing, carefree, optimistic and impulsive behaviour, is indicated.

On task one, male complex extraverts classified fewer of the words of high ambiguity as verbs than did complex male introverts, while for simple male subjects there was little variation across the levels of extraversion. A similar difference in classification strategy occurred for the female complex extraverts as for their male counterparts, but female simple extraverts made more verb classifications than did simple female introverts. The interactions of extraversion and complexity were thus different between sexes, producing the significant three-way interaction.

A significant three-way interaction on sorting time for task one was obtained. For the male subjects of high complexity, little difference in task time was manifested across levels of neuroticism. Simple stable males, however, took more time than simple unstable males. Among female subjects, the effect was most totally reversed, with simple subjects in both levels of neuroticism using a similar amount of time, while complex stable females took longer than complex unstable females. For males, then, high complexity may tend to negate the effects of emotional instability on speed; for females, low complexity has that effect. Further investigation with attempts at replication will prove enlightening in this regard. The relationship between neuroticism and female gender would also have to be considered and addressed.

The significant effect of order on sorting time appears to be a function of learning. Where the sorting task was immediately preceded by the slide-projected stimulus task, both of which required explicit classification as to form-class, task time was reduced. When the sorting task occurred before the slide task, task time was increased. In one other order, the composition task immediately followed the slide task, occurring before the sorting task. In that order, sorting time was reduced only slightly. It is suggested that the immediate prefacing of the sorting task with a similar task facilitated performance, through increased familiarity with the type of task.

In summary, neurotic subjects tend to utilize uncommon response categories more frequently than stable subjects, and give evidence of anxiety interference in motor/peripheral, as opposed to central/cognitive, performance. Extraversion and cognitive complexity also interact to produce differences in frequencies of uncommon responses, such that simple introverts give uncommon responses more frequently than the other three groups of the interaction. This finding is interpreted to support an elaboration hypothesis.

REFERENCES

Asch,S.E. Forming impressions of personality. Journal of Abnormal Social Psychology, 1946, 41, 258-290.

Bone, R.N. and Eysenck, H.J. Extraversion, field dependence and the Stroop test.Perceptual and Motor Skills, 1972, 34, 873-874.

Bryson, Jeff B. and Driver, Michael J. Cognitive complexity, introversion, and preference for complexity. Journal of Personality and Social Psychology, 1972, 23, 320-327.

Cattell, Raymond B. The scientific analysis of personality. Harmondsworth, Middlesex: Penguin Books, 1965.

Cattell, Raymond B.Personality and mood by questionnaire. San Francisco: Jossey-Bass Publishers, 1973.

Cohen, Jacob. The factorial structure of the WISC at ages 7-6, 10-6, and 13-6.Journal of Consulting Psychology, 1959, 4, 285-299.

Conrad, Carol. Context effects in sentence comprehension: A study of the subjective lexicon.Memory and Cognition, 1974, 2, 130-138.

Davies, Ann D.M. Temperament and narrowness of attention. Perceptual and Motor Skills, 1967, 24, 42.

Eysenck, H.J. Dimensions of personality. London: Routledge and Kegan Paul, 1947.

Eysenck, H.J. and Eysenck, Sybil B.G. Eysenck personality questionnaire.San Diego: Educational and Industrial Testing Service, 1975.

Eysenck, H.J. and Rachman, S. Causes and cures of neurosis. London: Routledge and Kegan Paul, 1965.

Farley, Frank H. and Farley, Sonja V. Impulsiveness, sociability, and the preference for varied experience. Perceptual and Motor Skills, 1970, 31, 47-50.

Jastrzembski, James E. and Stanners, Robert F. Multiple word meanings and lexical search speed. Journal of Verbal Learning and Verbal Behaviour, 1975, 14, 534-537.

Jung, C. G. Psychological types. London: Routledge and Kegan Paul, 1923.

Matarazzo, Joseph D. Wechsler's measurement and appraisal aof adult intelligence (5th ed.). Baltimore: The Williams and Wilkins Company, 1972.

Miller, George. The subjective lexicon. Presidential address, 78th Annual Convention, American Psychological Association, September, 1970.

Perfetti, Charles A. and Lindsey, Robert. Polysemy and memory. Journal of Psycholinguistic Research, 1974, 3, 75-89.

Radford, John and Kirby, Richard. The person in psychology. London: Methuen and Co. Ltd., 1975.

Roydes, Rona L. and Osgood, Charles E. Effects of grammatical form-class set upon perception of grammatically ambiguous English words. Journal of Psycholinguistic Research, 1972, 1, 165-174.

Schroder, Harold M., Driver, Michael J. and Streufert, Siegfried. Human information processing. New York: Holt,

Rinehart and Winston, Inc., 1967.

Slosson, R.L. Slosson intelligence test for children and adults. East Aurora, N.Y.: Slosson Educational Publications, 1963.

Wechsler, David. The measurement and appraisal of adult intelligence (4th ed.). Baltimore: The Williams and Wilkins Company, 1958.

West, Michael.A general service list of English words.London: Longmans, Green and Co., 1953.

West, Michael.A general service list of English words.London: Longmans, Green and Co., 1964.

Young, Maureen M. Children's ability to define words as a function of (a)intelligence and (b)social class. Papers in Psychology, 1969, 3, 71-72.